## THE AMERICAN CHEMICAL SOCIETY.

The annual meeting of the American Chemical Society was held on Friday evening, December 2nd, with Vice President Leeds in the chair.

After the reports from the various officers were read, the society proceeded to the election of officers to serve during the coming year.

The results were as follows:

*President:* J. W. Mallett.

*Vice Presidents:* A. R. Leeds, W. M. Habirshaw, E. Waller, L. A. Goessman, A. B. Prescott, N. P. Lupton.

*Treasurer:* T. O'C. Sloane.

The remainder of the ticket, as announced in the previous notice, were all elected with the single exception of the treasurer, whose name was substituted by that of Dr. Sloane, whose name on the nominating committee was replaced by that of Mr. A. P. Hallock.

The board of directors will be as follows:

P. Casamajor, Jas. H. Stebbins, Geo. A. Prochazka, H. Endeman, H. Morton, P. de P. Ricketts, T. O'C. Sloane, A. R. Leeds, W. M. Habirshaw, E. Waller, C. F. Chandler, J. B. F. Hernshoff, W. E. Geyer.

The reading of the papers announced for the evening was postponed until the conversazione, which will take place on the evening of the 16th inst.

"J. W. Mallett," says Prof. Silliman, "has for many years been an industrious worker, publishing original researches in chemical subjects, which form important contributions to our science."

Among the very first to work in the then newly isolated element, Tellurium, was Prof. Mallett. Under the direction of the celebrated Woehler these researches were made, and, in recognition of their merit, the university at Gottingen conferred the doctorate on the youthful scientist. Coming to this country, for Prof. Mallett is an Englishman by birth, he located himself at Philadelphia with Mr. J. C. Booth who, at that time, had among his students and assistants T. H. Garrett, the two Morfits, McCulloh and others whose names have since become distinguished.

Later on, in the records of American chemistry, the subject of our sketch was appointed Professor of Chemistry at the University of Alabama, and at present he fills the same position at the University of Virginia; he also lectures in applied chemistry before the students at the Johns Hopkins University. His printed papers are very numerous, most of the earlier ones may be found in *Silliman's Journal*, while those of a more recent date have been published in the *American Chemical Journal*. To this latter periodical he has been a faithful contributor since its commencement, and its columns have been enriched by his very interesting review "Of the Progress of Science Among the Industrial Arts During the Last Ten Years." Prof. Mallett served as one of the judges in Group III at the Centennial Exhibition, and furnished for the governmental reports a very satisfactory resumé of the sugar industry of the United States.

He is a member of the Royal Society of Great Britain, of the Chemical Societies of London, Berlin and Paris, as well as many other learned bodies both at home and abroad. The American Chemical Society have made a wise selection, and it is to be hoped that its new president will resume that desirable custom of presidential addresses, which unfortunately has been omitted during the past few years. M. B.

---

COMMANDER CHEYNE has started on his trip to Canada, and will return to New York about the 20th of January; in the interval Mr. Henry Walton Grinnell, who has consented to become Secretary of the committee to be formed to promote this expedition, will attend to matters requiring early attention.

## THE NEW YORK ACADEMY OF SCIENCES.

Dec. 5. 1881.

REGULAR BUSINESS MEETING.

The President Dr. J. S. NEWBERRY, in the Chair.

Twenty six persons present.

Dr. NEWBERRY exhibited an ancient perforated stone axe from Europe, consisting of dioryte, and remarked that the aboriginal tribes of America never attained to the degree of skill required in the perforation of stone implements for the insertion of wooden handles.

The following paper was read by Dr. ALEXIS A. JULIEN.

### THE VOLCANIC TUFFS OF CHALLIS, IDAHO, AND OTHER WESTERN LOCALITIES.

(*Abstract*).

In a paper recently read before the Academy it was shown that a certain compact white almost structureless rock, often porcellanous in texture, occuring abundantly in the Western Territories and variously styled "trachyte," "rhyolyte," "porphyry," etc., (*e. g.*, at Leadville, Colorado, in the Black Hills of Dakota, etc.), is a sedimentary form of a highly silicious volcanic tuff, probably derived from the finest detritus of trachytes, rhyolytes, and quartz-porphyries. A series of specimens collected by Prof. NEWBERRY, during the last and previous summers, and kindly put in the author's hands for lithological examination, has furnished the material for the following additional notes on this interesting but neglected group of wide-spread American rocks.

1. *Coarse pumice-tuff of Challis, Idaho.*

The rock is quite compact, chistose, of a gray color with dull white spots. The latter consists of pumice in finely fibrous grains, from 1 to 5 mm. in length. Quartz and feldspar are seen in small angular flakes, sometimes reaching 0.5 mm. in length: hornblende commonly in fibrous black fragments, about 1 mm. in diameter: and much biotite, brownish-green, sometimes brownish-black, with greasy lustre, in hexagonal scales, often up to 2 to 3 mm. in size.

The thin sections present under the microscope numerous grains, generally angular, of several minerals, varying in size up to 3 or 4 mm.: pumice in rounded to sub-angular fawn-colored fragments lying at all angles, commonly made up of straight or curved fibres, and often including glass lenses filled with crystallites: a trichinic feldspar, in clear grains, sometimes including minute globules of glass, and possessing fine lamellation, beautifully striated in polarized light, the remaining traces of crystalline outlines indicating that these grains are all of fragmentary, never of indigenous formation: quartz, in water-clear angular grains, 0.2 to 1. 6mm. long, retaining more frequent and perfect traces of their crystalline forms, their sides being often very ragged, curiously and deeply eroded into rounded indentations, while within occur numerous inclusions of the ground mass and of scales of biotite, long greenish needles of hornblende, and sub-angular drops of a brownish-violet glass with one or several fixed bubbles of gas: biotite in abundant irregular scales, 0.2 to 1.3 mm. long, brown inclining to maroon or brownish-yellow, cloudy to opaque, with some dichroism remaining in the striated sections; hornblende in brownish-green, strongly dichroic, fibrous crystalline flakes: opacite, probably magnetite, and ferrite or iron-oxide, in dusty particles or groups in the biotite scales and among the pumice fibres. The fine groundmass is mainly composed of minute fragments, fibres, scales, etc., of all these minerals: also in large part of solid globules of fawn-colored glass, or of thin and apparently hollow shells, or of fragments of quartz or feldspar coated with a glass crust. Many of

these forms are found adhering in curious aggregations or with their sides crushed in.

The general constitution of this rock is similar to that of the volcanic tuff of the El Dorado Cañon, Cal.

2. *Fine green volcanic tuff, of Challis, Idaho.*

A very fine compact rock, with almost the texture of stoneware, with a pale, greenish-gray color, and a very thin parallel lamination. A few minute scales of biotite can be distinguished by the loup. The surfaces of fissures are mottled and spotted with bluish-green and ochreous, brownish-gray films.

The thin sections present the same constitution as that of the coarse variety of the rock, without the presence of pumice, the particles of quartz and feldspar varying in size from 0.06 to 0.25 mm. Biotite is abundant in scales 0.1 to 0.2 mm. in diameter, often of ochreous shades of brownish-yellow and maroon, through partial decomposition, and with curved fibres or wrinkles as if crushed in by pressure. To its abundance are due the fine lamination of the rock and, in part, its greenish color. The ground mass largely consists of globules of colorless glass, but in less degree than in the preceding variety, their size varying from 0.006 to 0.01 mm.

3. *Fine white pumice-tuff, of Challis, Idaho.*

A very fine compact rock, grayish, with a bronze shade, with a lamination so decided that it inclines to slaty. Under the loup the same constituents are visible as in No. 1.

The thin sections show a close relationship to those of No. 2. A little hornblende is present. Biotite occurs in distinct scales, sometimes hexagonal, not so minutely dispersed as in No. 2, generally 0.01 to 0.1 mm. in diameter. The fragments of quartz and feldspar, as a rule, present their longer axes in the schist plane, varying from 0.03 to 0.22 mm. in length. The glass inclusions in the quartz, ranging from 0.002 to 0.037 mm. The ground mass appears to be mainly composed of pumice, more or less altered, in very minute fibres and particles.

This rock strongly resembles the tufa of the lignite beds near Osarisawa, Akita, Japan.

4. *Pumice-tuff, Moore Station, Pancake Range, Moray, Nevada.*

This rock is decidedly ochistose, cream colored, nearly white, of a fine grain, intermediate between Nos. 1 and 2, most of the constituents being the same as in No. 1 and less than 0.5 mm. in diameter, though occasional grains of pumice, gray and red obsidian, and perfect crystals of quartz may reach from 2 to 8 mm. in length.

In the thin section the constituents are found disposed with great regularity: pumice, with its fibres often curved, as if crushed while still soft and plastic: quartz: trichinic feldspar: possibly sanidine: magnetite: ferrite: biotite, salmon colored, sometimes very cloudy: and volcanic glass in cellular network, often full of gas bubbles, elongated and distorted. In the ground mass, globules of glass and fibres and threads of pumice largely predominate.

The pumice in all these tuffs is not perfectly isotrope between the crossed nicols, but presents innumerable, though exceedingly minute glittering points, apparently crystallites formed by incipient devitrification. A few minute spherœlites were also detected.

5. *Stratified Rhyolye-tuff, Tempiute, Nevada.*

A snow-white Kaolinic variety, related to the preceding, which appears to consist principally of pumice. A few grains of black obsidian and red quartzite occur, the latter also as a somewhat rounded pebble, 34 mm. in length.

The thin section, transverse to the schist-plane, presents an interesting structure, made up of granular layers alternating with others possessing strong fibration.

The material of the former is mostly like that of No. 4: feldspar is sparsely scattered: quartz fragments abound, with the usual glass inclusions, and with sides deeply eroded and indented: also magnetite, ferrite, and minute colorless particles of a polarising mineral, perhaps Augite, in a predominant groundmass of particles and fibres of pumice and glass, rich in dark gas-bubbles.

The alternating fibrous laminæ consist of a true rhyolyte material, salmon-brown, with a marked fluidal structure around the few quartz-grains, and displaying in spots, and especially next the junction, with granular material, the constituent pumice-fibres whose partial interfusion or cohesion seems ordinarily to have produced the solid laminæ.

The arrangement of the glass fibres in parallel planes may have been produced by sorting in the air during their fall, by later superincumbent pressure while still hot and plastic, or it may be in some instances by the influence of overflowing lava-sheets. The cohesion produced by such downward pressure and interfusion has produced a structure which can hardly be distinguished from that of many obsidians and rhyolytes.

6. *Fine white pumice-tuff, from mouth of Bill Williams fork of Colorado River, Arizona.*

A compact white schist, with almost the fine texture of No. 3, traversed in places by brown curved impressions, apparently produced by rootlets.

The thin section mainly exhibits a very finely felted mass of short, straight fibres of pale brownish pumice. Besides these only a very few black particles of magnetite, feldspar, etc., were distinguished.

7. *Fine brownish pumice-tuff, from last locality.*

A brownish variety of the preceding, with abundant minute black particles. The slaty lamination is decidedly marked, with slight adherence over many planes at which the rock breaks easily, presenting remarkably flat surfaces.

The constitution displayed in the thin section is similar to that of the preceding specimen. Minute glass globules are abundant, and also more numerous angular particles of other minerals: colorless feldspar (sanidine?) showing cleavage: brownish and greenish augite: brownish and dichroic fibres of hornblende, and black particles of magnetite.

8. *Stratified pumice-tuff, from Black Mountains, Colorado river, Arizona.*

A coarser stratified tuff with brown and white layers, in which grains of pumice, obsidian, glassy feldspar, and quartz reach a diameter of 1 to 5 mm.

The thin section is rich in pumice in all its fibrous, curving, and reticulated forms, and in minute globules, threads, and shreds of volcanic glass: angular grains of finely lamellated plagioclase, water-clear quartz, and sanidine with well marked cleavage and often zonal stricture: particles of biotite, hornblende, magnetite and ferrite: abundant grains of augite, angular to rounded, sometimes retaining its optical characteristics in spots, but mostly decomposed and isotrope, colorless, brownish-yellow, light to deep maroon, etc., finely granular, thready, or fibrous, and more or less darkened by opacite even to complete opacity.

9. *Basalt-tuff, or peperino, Chenniti Mts., Texas.*

A fine-grained olive-green rock, with white streak, friable to arenaceous, with barely perceptible schist structure in the specimen. Under the loup, minute granules of feldspar, quartz, etc., are distinguishable, rarely 1 mm. in diameter, embedded in a grayish-green cement.

In the thin section the constituents are very much the same as in No. 8, with the exception of hornblende, and all the grains are in large part rounded. A few elongated rounded grains of a basaltic lava are also included, highly micro-crystalline with minute ledge of plagioclase scattered through a reddish-brown opaque base.

This specimen, and perhaps the preceding, represent the basic division of the tuffs, being ejections from an eruption of basaltic lava, though naturally composed of its more fluid, glassy, and acid scoria.

From these facts it may be concluded that enormous

masses of volcanic tuffs of widely varying character are dispersed throughout these regions in the West to an extent which could hardly be appreciated from the meagre references in our present petrographical literature.

In his discussion of the rhyolytes of the fortieth parallel, Zirkel remarks : *

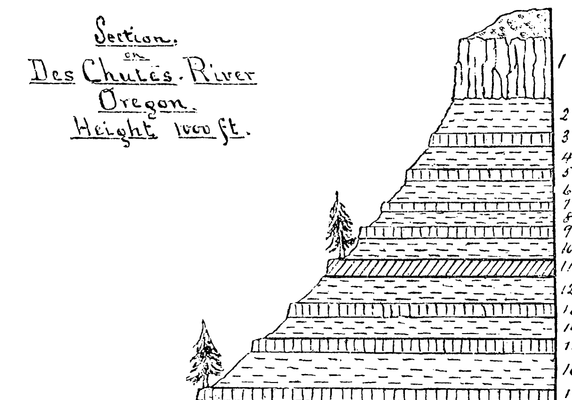
"The foregoing descriptions show in what abundance those fibrous bodies in which the fibres are not grouped radially around a centre, as in sphœrolites, but arranged axially along a longitudinal line, are disseminated through these rhyolites.... These axiolites usually consist of distinct, uniformly thin fibres, or of wedge-like particles.... We see in the arrangement of the fibres in these rhyolites four different types : *a*, centrally radial : *b*, longitudinally axial : *c*, parallel : *d*, confused and orderless. The development of fibres is, indeed, a phenomenon very characteristic of rhyolites, etc., etc.'

A comparison of these facts with those presented in my examination of these tuffs appear to me significant, not of the development of fibration, etc., in a fused mass, but of the fragmental origin of at least many rhyolytes, obsidians, etc., as suggested in the study of No. 5. The evidences of the hot and plastic condition of the fibres and drops of volcanic glass, with the occasional exception of a cooled outer shell, for a long time after their fall, and of a tendency to the growth of microliths, sphœrolites, etc., within them, may offer another mode of origin for the formation of axiolites and sphœrolites. The anomalous presence of augite in a quartzose rock like rhyolyte, to which Zirkel calls attention in the same passage, may also find explanation in the varied intermixture of minerals which prevails in many tuffs, rather than to indigenous development within an acid lava.

Dr. NEWBERRY said that he had no doubt that Mr. Julien was quite correct in regard to the genesis of the peculiar rocks which he had described. He had collected the specimens and was able to supply some facts in regard to their mode of occurrence. They belong to a series of rocks, plainly volcanic, but of which the history has not been given by those who have studied the volcanic rocks of the West. The circumstances of their occurrence are briefly these : over a great belt not less than one thousand miles wide in some places, viz., from the crest of the Sierra Nevada to the eastern foothills of the Rocky Mts., and with a north and south extension of thousands of miles in British Columbia, the United States and Mexico, we have an extraordinary display of the products of volcanic action. This is the great silver belt of the world, and is also rich in mines of gold, copper, lead, etc. Throughout all the Paleozoic and Mesozoic ages this country was an unbroken though not entirely unwarped sub-marine or sub-aerial plateau, where the most continuous and extensive series of sedimentary rocks was deposited of which we have any knowledge. At the close of the Jurassic age the western portion of this region was folded up, to form the great chain of the Sierra Nevada and Cascade Mts., and along this line of fracture numerous volcanic vents were established, Lassen's Butte, Mt. Shasta, Mt. Hood, Mt. Baker, etc., which have continued in intermittent activity to the present day. In Tertiary times the plateau east of the Sierra Nevada was broken up by a series of north and south fractures resulting in the formation of the remarkable system of meridional mountain ranges which constitute the chief topographical features of the district. These mountain ranges are composed of blocks of Paleozoic limestones and sandstones --now converted into marbles and quartzites—set up on edge or at a high angle, or of volcanic materials which have welled up through some of the fissures. Along the lines of fractures are great numbers of hot springs, the representatives of thousands more which existed in former days, and to which we owe the great system of fissure veins of this country :—hot water charged with mineral matter gradually depositing this and filling the channels through which it flowed.

The volcanic rocks which have been poured out in so many places exhibit a great variety of physical and chemical characters, but have been grouped by RICHTHOFEN and ZIRKEL into five species—propylite, rhyolite, trachyte, andesite and basalt. Capt. DUTTON who has given great attention to the volcanic rocks of the West, has distinguished a larger number of kinds and has adopted a different classification. Aside from these massive rocks there is another group which constitutes a marked feature both in the topography and geology, and these are those which have been made the subject of Mr. JULIEN'S paper. They are generally soft in composition, often highly colored,—white, red, blue, green, gray or yellow—more commonly white, red or gray. They are often quite local and usually occupy the lowlands, frequently underlying much of the level surface between the mountain ranges ; and their best exposures are seen in the banks of streams which have cut these lowlands. There they are shown to be often horizontally bedded and sometimes interstratified with lacustrine sediments and sheets of basalt. Typical exposures of these rocks may be seen at Eureka, Nevada, where houses and cellars are excavated in the soft material which forms the sides of the valley ; at Challis, in the banks of Salmon River and Garden Creek, whence the specimens described by Mr. JULIEN came, and in the cañons of the Des Chutes and its tributaries in Oregon.

Economically these rocks have considerable inportance as they are extensively used in place of fire brick for lining lead smelting furnaces, being very refractory, and easily dressed into shape with an old axe.




The above section represents the filling of some of the fresh water lakes which formerly existed in Oregon just east of the great volcanic cones of the Cascade Mountains. Numbers 1 and 11 represent sheets of basalt, the even number softer tuffs and bed of diatomaceous earth, the odd numbers consolidated conglomerates of volcanic materials called "concrete" in my notes.

The study of a large number of outcrops of this series of rocks from Southern Arizona to the Columbia River has convinced me that they are generally volcanic ashes which have been washed down and more or less perfectly stratified in bodies of water which formerly occupied the intervals between the mountain ranges of the great basin. On the Des Chutes a section of more than 1000 feet shows 25 alternations of strata, many of which are examples of the rocks in question. Here they are interstratified with beds of tripoli, composed of fresh water diatoms, and layers of basalt. Some of the ash beds are almost entirely composed of lapillae of soft cottony pumice, others are finer, grey, red, white, etc., and contain the trunks of coniferous trees, and in some instances

* U. S. Geol. Expl. 40th Par., VI, Microsc. Petrog., pp. 201-205.

are pierced with holes which represent the stems of upright plants, thickets of which were buried by the descending showers or rapidly accumulating sediment of volcanic ash. Here the source of the materials is to be sought in the line of great volcanic vents which crown the summit of the Cascade Mountains, and from which, at intervals, were emitted either floods of lava, poured down on to the plain along the eastern border of the range, or showers of ashes which, borne inland by the prevailing westerly winds, fell on forest, savannah and lake, temporarily destroying animal and vegetable life and forming, when falling or washed into water basins, strata which alternate with fossil beds, the accumulations of quieter times. In other places these tufaceous deposits were washed from all the highlands into the valleys, forming local masses of considerable thickness without the intercalated beds mentioned above.

The accompanying section, copied from my report on the Geology of Northern California and Oregon (Pacific R. R. Report, Vol VI, Geology, p. 47), will illustrate the deposition of these tufaceous rocks in the lake basins where they are inters'ratified with the fossiliferous beds.

## THE SCIENTIFIC SOCIETIES OF WASHINGTON, D. C.

THE PHILOSOPHICAL SOCIETY.—During the month of November three very important papers were read: on the Anomalies of Sound Signals, by President James C. Welling; on the Storage of Electric Energy, by Mr. J. C. Koyl; and on Baiometric Hypsometry, by Mr. G. K. Gilbert.

The first named paper was a comprehensive review of the vexed discussion concerning the anomalies observed in the transmission of sound, and the summation of the result in a series of twelve aphorisms. The second paper was by a fellow of Johns Hopkins College, with reference to a series of experiments lately made by him in company with some Washington gentlemen upon an invention for the storage of electricity. Mr. Gilbert's communication had reference to a scheme of measuring altitudes by means of two barometric stations in the same vicinity, the one quite elevated, the other as low as convenient. By this means the influence of the thousand and one local causes affecting the barometer would be more thoroughly brought under the knowledge of the observer.

THE BIOLOGICAL SOCIETY.—The following communications have been made during the past month: on the Philosophy of the Retardation of Development Among the Lower Animals, by Prof. C. V. Riley; Antiquity of Certain Types of North American Non-Marine Mollusca, and the Extinction of Others, by Dr. C. A. White; Recent Explorations of the U. S. Fish Commission, by Mr. Richard Rathbun.

Professor Riley drew the attention of the society to a number of instances where the development of insects had been retarded in the embryo stage for a very long time. This did not refer to the well known retardations of whole broods, but to wholly exceptional cases. The speaker attributed the phenomena to evolutionary causes, and showed how a species might be saved from the wholesale destruction of a very severe winter or other disaster by this means.

Professor White's paper had reference to the survival from very high antiquity of many of the fresh water and brackish water forms, and to the total disappearance of others, for which events no adequate causes can be assigned.

Mr. Rathbun's communication was a review of the work of the Fish Commission from its foundation, illustrated by a map locating every dredging station; by a papier maché model of the Atlantic bottom as far out as the deep soundings, from the mouth of the St. Lawrence southward, and by specimens of the apparatus employed as well as the fauna discovered. The address was necessarily very comprehensive, but exceedingly interesting. At the same time the attention of the society was called to a pamphlet by Prof. G. Brown Goode, entitled "The First Decade of the United States Fish Commission, its Plan of Work and Accomplished Results, Scientific and Economical, Salem, Mass.: Salem Press, 1881."

THE ANTHROPOLOGICAL SOCIETY.—Three papers were also read before this society in November, to wit: How Shall the Deaf be Educated? by President E. M. Gallaudet; a Navajo Myth, by Mr. R. L. Packard; the Regulative System of the Zunis, by Prof. J. Howard Gore. The education of the deaf must be preceded by a proper classification of the heterogeneous group commonly called deaf mutes. The question of the relative superiority of the sign language and of visible speech was discussed with great minuteness. The author also treated the problem of heredity, of relative intelligence, and of the power of abstraction, with great ability.

Mr. Packard's myth was one taken by him last summer from one of the Navajo tribe and related to the origin of the Navajos.

Mr. Gore has spent some years upon the evolution of deliberative assemblies and the conduct of such bodies. Last summer, being in charge of a surveying party in New Mexico for the government, he availed himself of his opportunities to become familiar with the customs of the Pueblo Indians in such matters. These papers will be published in the proceedings of the Society.

## DIAGRAMMATIC REPRESENTATION OF STEREOSCOPIC PHENOMENA.

(*Continued from p.* 548, *Nov.* 19*th*, 1881, *in Transactions of N. Y. Academy of Sciences*).

In a previous article ([8]) it has been shown that no reliance can be placed upon the theory of apparent distance in the stereoscope, elaborated by Wheatstone and Brewster, and applied in the diagrammatic explanation of stereoscopic phenomena in all our text books on Physics. We may well ask, therefore, to what extent it is possible, by any diagram, to represent the position of objects as they should appear in the stereoscopic field of view. So far as this is determined by the relation between the visual lines we may secure an approximation only by the following method, in which it must be assumed that we know also the relation between the camera axes at the time the photograph was taken. Since the visual lines may be practically regarded as special secondary axes to the crystalline lenses, it will be found convenient to call them visual axes, and their possible relations, axial convergence, parallelism, and divergence. It may be well also to restate two principles that have been sufficiently demonstrated elsewhere.

I. A point farther or nearer than the point of sight is necessarily seen double ([9]) and with imperfect focalization. If farther, the internal rectus muscles of the eyeballs must be slightly relaxed to make it the point of sight; if nearer, they must be contracted. Such relaxation is habitually associated with remoteness, such contraction with nearness, of the point fixed.

II. If an external point is imaged upon corresponding retinal points, the subjective effect is that of union of the two eyes into a central binocular eye, the nodal point of which is the point of origin in all estimates of direction and distance.([10])

A brief preliminary proof of a geometrical principle to be applied is also necessary. Let C and C', fig. 1, be two fixed points, and E midpoint between them on a horizontal plane. Let this plane be cut by four vertical planes, parallel to each other, their traces being marked I, II, III, and IV. Let B and Q be any points of plane I, from which straight lines are drawn to E, piercing plane II at A and P respectively. Through C and C' let pro-